BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of the Milwaukee Water Works
for Authority to Increase Water Rates — Docket 3720-WR-108

REBUTTAL TESTIMONY OF ERIK GRANUM ON BEHALF OF MILWAUKEE WATER WORKS

Q. Please state your name.

A. My name is Erik Granum.

Q. Have you previously submitted direct testimony in this proceeding?

A. Yes.

Q. What is the purpose of your rebuttal testimony in this proceeding?

A. The purpose of my rebuttal testimony is to address several issues and arguments raised by Patrick Planton (PSC REF#:205719) and Eric Rothstein (PSC REF#:205715) in their direct testimonies and present further evidence to support the customer class demand ratios developed in Ex.-MWW-Cramer-2 (PSC REF#:204119) and used in Schedule 9 of MWW's Revised Cost of Service Study (PSC REF#:205539).

Q. Do you have any general comments regarding the testimony of Mr. Planton and Mr. Rothstein?

A. Yes. Their testimony contains many arguments related to the Customer Demand Study. I will address each of these with additional explanation to the extent possible. However, they made no comment about the data itself; I can only infer from that exclusion that it is not in dispute.

Q. Mr. Planton and Mr. Rothstein claim that the Customer Demand Study is intended to shift costs from retail to wholesale customers. Is this accurate?

A. No. The goal of the Customer Demand Study was to collect and analyze actual demand data in order to determine peak demand factors that result in an appropriate and fair cost allocation to all customer classes. This was done using actual hourly data that MWW spent considerable time and resources collecting. In fact, several conclusions are made and resulting factors proposed that do not benefit MWW retail customers. Their alternatives, which are based on assumptions about peak demand patterns, benefit only wholesale customers to the detriment of retail customers (and the wholesale customer Milwaukee County) without providing appropriate justification; in some cases, contrary to other of their arguments.

Q. On page 9 of Mr. Planton's direct testimony, he states that the Customer Demand Study "proposes to increase demand ratios for wholesale communities and decrease demand ratios for retail customers." Is this assertion correct?

A. No. This is a generalization. The Customer Demand Study proposes demand ratios for all customer classes that are based on the results of the data analysis. For the wholesale customer classes, 15 of the 20 peak demand factors are proposed to be increased from MWW's 2009-11 Rate Case (PSC REF:146073) based on the results of the study; 5 of the 20 peak demand factors are proposed to be decreased for wholesale customer classes. For the retail customer classes, 5 of the 8 peak demand factors are proposed to be decreased from MWW's 2009-11 Rate Case, 2 of the 8 peak demand factors are proposed to be increased and 1 of the 8 peak demand factors is proposed to be unchanged.

Q. Mr. Rothstein claims that the Customer Demand Study does not contain sufficient data. Is this accurate?

A. No, it is not. The amount of data that was analyzed in the course of conducting this study was considerable. In fact, the study contained over one million data points between retail and wholesale customers. Ms. Cramer speaks to the dataset further in her rebuttal testimony.

Q. Throughout Mr. Planton's and Mr. Rothstein's direct testimony, they allege that the derivation of wholesale customers' demand ratios rely too heavily on data from 2012, which was a hotter-than-average year What is your response to these assertions?

A. Mr. Planton provides testimony and exhibits stating that 2012 was an exceptionally hot and dry year. I would agree that May, June and July of 2012 were hotter than normal and that June 2012 was an exceptionally dry month. However, his assertion that the study relies on 2012 data is incorrect. In fact, more data was utilized for wholesale customers during 2013 than during 2012. Additionally, Mr. Planton testifies on page 11 of his direct testimony that 2013 was "much cooler than 2012" and that "2013 was an extremely rainy spring and fall…" By his own argument, this means that 2013 data would exhibit lower peak water usage. The methodology in determining the demand ratios for wholesale customers took weather fluctuations into account by averaging the most recent data from 2012 and 2013 (that indeed appear to have weather patterns above and below the norm, as I will detail further) in order to arrive at figures that are representative of a recent average, or typical, year for wholesale customers. Additionally, Mr. Planton and Mr. Rothstein fail to acknowledge in their hypothesis that it is also intuitive that during times

of hot weather, average water usage would expect to increase as well as peak water usage, which would mitigate the impact on the peak day to average day ratio.

To clarify the analysis, the 12-month periods that the Study references are the ratios of maximum day usage and maximum hour usage to average day usage for the previous 12 months (January to January, February to February, March to March, etc.). The reason the study looked at this is to avoid looking exclusively at the arbitrary beginning and ending points of the calendar year, which is how wholesale demand factors were previously calculated using PSC Annual Reports. As the study shows, ratios vary by period, even when using the same maximum day within that period. Of course, ratios also vary as the peak day changes, usually on an annual basis, but not always. By examining all of these data points, average peaking factors for wholesale customers are better determined. The Study explains that more data would allow examination of dozens of these 12-month periods, which eventually would reveal each wholesale customer's typical demand factors with greater precision.

Q. Do you have any other comments on the weather-related exhibits (PSC REF#:205721, 205722, 205723, 205724) presented by Mr. Planton?

A. Yes. Mr. Planton provides a limited number of data points in his exhibits, chosen specifically to support his arguments. I offer several exhibits that show a more complete picture of weather patterns in 2012 and 2013, as well as normal weather patterns in the Milwaukee water service area. Ex.-MWW-Granum-4 is similar to Ex.-Wholesale Customers-Planton-4, which compares mean monthly temperature at Mitchell International Airport for 2012 and 2013. Ex.-MWW-Granum-4 exhibit also shows mean monthly temperature for the Mitchell Airport station, but also includes the normal mean

monthly temperature for the years 1981 through 2010, and a more recent normal mean monthly temperature for the years 2008 through 2013. The chart shows that temperatures in March, May, June and July were above normal temperatures for those months. April was about normal, August was slightly above normal, but September and October were slightly cooler than normal. 2013 appears to be much closer to the normal monthly temperatures when compared to the years 1981 – 2010; however, the chart also shows that average monthly temperatures at this weather station location in the last 6 years have risen higher than the 30-year average. When looking at this more recent average, 2013 was actually generally a cooler year, except September and October, which were slightly above normal.

Ex.-MWW-Granum-5 shows the same data, only for the weather station located at Mount Mary College in Milwaukee, which is in a different geographic location of MWW's service area. It is in the west to northwest part of the service area, much further inland, and much closer to the wholesale communities of Wauwatosa (bordering it), Butler, Menomonee Falls, Brown Deer and Milwaukee County Institutions. This data shows the same general patterns, with a few noteworthy differences. First, in general, temperatures are slightly warmer in general during spring and summer at this location. Second, the 30-year mean monthly temperature is much more closely aligned with the 6-year mean monthly temperature from 2008 to 2013. Third, 2013 temperatures seem to be more clearly cooler than the normal year, with 2012 having similar patterns as at the Mitchell Airport location.

Mr. Planton also implies that precipitation affects peak water demand, giving testimony that several months in 2013 were wetter than normal. Ex.-MWW-Granum-6

shows total precipitation data at the Mitchell Airport weather station location for the same timeframes as Ex.-MWW-Granum-4 and Ex.-MWW-Granum-5. Again, this offers a more complete picture of weather patterns. During 2012, monthly precipitation varied, with March, May and October being slightly wetter than the 30-year average, July about average, and April, June, August and September drier than the 30-year average. 2013 shows considerably more variation, as April, May, June and October were wetter than average, and March, July, August and September drier than average. Additionally, the 6-year average from 2008 through 2013 shows quite different precipitation patterns than the 30-year average from 1981 through 2010. Based on this chart, it would take considerably more data and a tremendous amount of effort to determine what would constitute a typical year of precipitation, especially seeing how much precipitation has changed in recent years as compared to earlier years. Ex.-MWW-Granum-7 shows the same data for the weather station location at Mount Mary College. This shows similar patterns of precipitation, but with even more extreme fluctuations.

Mr. Planton only speaks to weather patterns as a main variable in peak water demand for wholesale customers. However, he does not offer sufficient evidence to prove that using 2012 and 2013 data would not result in appropriate demand factors. In fact, 2012 and 2013 do have weather patterns both higher and lower than the average year, making an average of the two appropriate. Further, the effect of weather on water demand patterns is much more complicated than temperature and precipitation, especially given the clear climate differences even within MWW's geographic service area. It would require an incredible amount of research and analysis to determine the exact relationship between weather and peak water demand, which would not even consider economic

factors, demographics, land use and changes in customer behavior. A better approach to determining peaking factors for the wholesale customers is simply to examine the water use directly, which is what was done in the Customer Demand Study, using as much data as was available over a period of time that included very different weather-related variables.

Q. On pages 11 and 12 of his direct testimony, Mr. Rothstein gives an example of how a methodology using averages is flawed. How would you respond to this example?

A. Mr. Rothstein's example is an oversimplification using numbers that are constructed solely to make his point. To address Mr. Rothstein's example, other similar examples could be devised: if the 9th and 10th years were 2.0 and 1.0, then the average would be 1.5; if the 9th and 10th years were 1.0 and 1.5, then the average would be 1.25. This example is meaningless, especially as it's referencing a concept that is irrelevant for the purpose of determining reasonable peak demand ratios.

Q. Mr. Planton and Mr. Rothstein discuss the time periods used in developing peak demand ratios for different customer classes. How do you respond to this discussion?

A. Firstly, the goal of developing peak demand ratios is to determine what they would be in a typical, or average, year. This fact alone means that it is not required that demand ratios be developed using data from the exact same time period for all customer classes. Secondly, it is not generally feasible to collect data for all customer classes at the same time due to limitations in utility resources, unless the technology allows it. Therefore, different methodologies must be developed to determine typical customer class peak demand ratios based on the available data. Data need not be perfect in order to develop

appropriate customer peak demand factors. It is better to use the actual hourly data that has been collected and analyzed in determining peak demand ratios rather than use the assumptions that have been used in the past, and which the data show are not accurate. Mr. Rothstein himself testified to exactly this point in his rebuttal of William Stannard's testimony in the 2012 Oak Creek case, PSC Docket No. 4310-WR-104 (PSC REF#:164809):

> "Mr. Stannard's testimony articulates the view that the Public Service Commission of Wisconsin (PSC) should let the desire for perfection – a full scale customer class metering study, be the enemy of the good – a marked improvement in class demand factors that more fully leverages available data." (Ex.-MWW-Granum-11)

In this case, MWW did actually conduct a customer class metering study, collecting and analyzing significantly more data than Mr. Rothstein has previously testified is necessary to develop appropriate demand factors.

Q. How does Mr. Planton propose to set demand factors for the wholesale customers?

A. On pages 12 and 13 of his direct testimony, Mr. Planton proposes to calculate wholesale demand factors in much the same way as they were calculated in MWW's 2009-11 Rate Case. For maximum day demand factors, he recommends to average "each wholesale customer's system data over 6 years (2007-2012)…" For maximum hour demand factors, he recommends to multiply each wholesale customer's resultant maximum day demand factor by 1.43.

Q. Is Mr. Planton's proposed method to determine wholesale maximum hour demand factors appropriate?

A. No. On page 9 of his direct testimony, Mr. Planton states that in the previous rate case, each "wholesale customer's max hour factor was based on the customer's max day factor times 1.43." It is inappropriate to continue to use this methodology since MWW has

conducted a study that uses actual measured hourly water usage for wholesale customers. Interestingly, one of the wholesale customers' witnesses in this proceeding, Andrew Behm, developed the previous methodology while he was employed by the PSC and provided testimony on behalf of the PSC. Mr. Behm explained how he developed this methodology on page D12.17 of his direct testimony in that proceeding (PSC REF#:130480).

> "No historical data is available for wholesale max hour extra-capacity ratios. Based on the review of the rate cases mentioned above (reference to Racine, Oak Creek, Kenosha, Menasha, Appleton, Sheboygan and Beloit), I estimated the ratio of maximum hour consumption to average hour consumption for each wholesale customer to be 1.43 times its ratio of maximum day consumption to average day consumption. I rounded max hour ratios up to the nearest hundredth." (Ex.-MWW-Granum-8)

The Customer Demand Study and underlying data clearly demonstrate that this methodology is not appropriate for developing max hour demand ratios for wholesale customers. This is further demonstrated in Ex.-MWW-Granum-9. The relationship between the maximum hour demand ratio and the maximum day demand ratio for wholesale customers varies widely both by customer and by time period for each customer. Further, the figure of 1.43 is inarguably too low for most of the wholesale customers. This is not surprising considering Mr. Behm's methodology consisted of looking at the rate cases of other utilities, the ratios of most of which also appear to be based on an assumed relationship between maximum hour demand ratios and maximum day demand ratios, rather than actual data. Regardless, a comparison to other wholesale suppliers' ratios for their wholesale customers is inappropriate, as Ex.-MWW-Granum-9 demonstrates that there is no consistent relationship between maximum hour demand ratios and maximum day demand ratios for MWW's wholesale customers. Mr. Rothstein

states as much in his own testimony. In fact, it appears that maximum hour demand for wholesale customers is much more determined by each customer's own internal operation of their respective water supply systems and use of their internal storage facilities.

Q. Is Mr. Planton's proposed method to determine wholesale maximum day demand factors appropriate?

A. No. It is inappropriate to determine maximum day demand ratios using Mr. Planton's method for the following reasons:

- *Use of data obtained from PSC Annual Reports*. The data that is contained in the PSC Annual Reports of each wholesale customer is limited. It only contains the maximum day demand for each calendar year and the source of the data is from each customer's own system, rather than a consistent source in MWW's own SCADA system. Additionally, two of the wholesale customers receive some of their water supply from other sources: Menomonee Falls receives a portion of its water supply from its own ground wells. Mequon receives a portion of its water supply from the North Shore Water Commission. However, demand ratios for MWW need to be set based only on the rate of water supply that MWW provides to these customers, which may be different than their own system demand ratios. This is not addressed in Mr. Planton's testimony. Further, the Customer Demand Study shows and testimony above explains why use of only a calendar year to determine peaking ratios is less than ideal.
- *Exclusion of 2013 data*. Presumably, at the time Mr. Planton performed his analysis of PSC Annual Report data, 2013 data was available. However, this is

excluded from Ex.-Wholesale Customers-Planton-6. Based upon his earlier testimony, it would seem to be to the wholesale customers' benefit to include 2013 data, which was a wetter than normal year, by Mr. Planton's own account. Its absence would seem to indicate that it would not be beneficial to the wholesale customers.

- *No calculation of proposed peaking factors for Mequon, Shorewood or Milwaukee County Institutions*. While Mr. Planton believes that "sufficient information is not available to perform the calculations" for these customers, he makes no attempt to develop a basis to determine reasonable ratios for these customers. In contrast, the Customer Demand Study does provide a logical, reasonable basis for determining demand factors for those customers and it does not make sense to ignore them. Additionally, Mr. Planton's solution of reverting to known incorrect figures is in direct contrast to his argument that demand ratios be "comparable across classes."
- *Unknown adjustment to Greendale information*. Mr. Planton makes an adjustment to Greendale's maximum day demand based on "testimony and an exhibit provided for in the 2010 rate case." However, he does not provide the calculations that support these adjustments, nor speaks to the appropriateness of continuing to use these adjustments that may or may not have been accepted. Additionally, MWW has already taken great care to adjust Greendale's data based on changes to Greendale's internal operations that were discussed with Greendale staff.

Q. On pages 12 and 13 of his direct testimony, Mr. Rothstein speaks to the lack of available data for Shorewood and Milwaukee County. Could you respond to his comments?

A. It has been noted above how Mr. Planton does not calculate ratios for Mequon, Shorewood or Milwaukee County in his proposed method. Mr. Rothstein then also criticizes the development of peak demand factors for Shorewood and Milwaukee County due to a lack of data. He first cites an excerpt from the Customer Demand Study that discusses the collection of data that seems out of context and irrelevant to this issue. He then criticizes using commercial retail demand factors as a proxy for Milwaukee County demand factors, by saying that "the assumption is not to assign system demand ratios…nor even the wholesale class average…" He then claims that this shifts costs to wholesale customers, except Milwaukee County. First of all, the Study notes why it is appropriate to use commercial retail factors for Milwaukee County, which is that the vast majority of internal customers and water usage of the Milwaukee County Institutions consist of users that would be classified as commercial (hospitals and related offices). . Second, the suggestion that system demand factors or wholesale class average demand factors be used instead would result in Milwaukee County having lower peak demand factors than are proposed by MWW. However, he also claims that the proposed peak demand factors being used by MWW result in a shift to the other wholesale customers. These arguments conflict each other.

Mr. Rothstein also makes no attempt at proposing a solution to the limited information available for Shorewood, only discussing how their demand factors are tied to the other wholesale customers. MWW began to collect hourly demand data from

Shorewood in March 2014; however, there is insufficient data available at the time of this testimony to determine appropriate peak demand factors using this data. Based on their monthly fluctuations in demand and the makeup of their customer base, an average of the other wholesale customers is reasonable and appropriate.

Q. On page 5 of his direct testimony, Mr. Rothstein speaks to the amount of residential data collected and the variability of residential demand. Could you offer further clarification to the residential analysis contained in the Customer Demand Study?

A. Yes. Mr. Rothstein contends that the time period over which the data was collected was insufficient and that the peak demand patterns during the months that were not sampled would not be similar to the patterns of the months that were sampled, and therefore the proposed demand factors should be discarded in favor of those used in the 2009-2011 rate case. More data from different time periods could further refine the demand factors; however, residential retail data was collected during three different seasons of the year, including the peak demand period of July 2013. Although there is not a comparison of retail residential monthly maximum day to average day ratios for each month in both 2012 and 2013, there is information comparing the maximum day to average day ratios month by month for wholesale customers that includes the 2012 and 2013 maximum months and days, which is shown in Ex.-MWW-Granum-10. This tests Mr. Rothstein's assumption that the ratio of maximum day demand to average day demand within the peak monthly demand of the retail residential customer class is variable based on overall peak water demand. As the table shows, there is actually little substantive difference between the ratios of peak monthly maximum day to average day ratios in 2012 and 2013 for the wholesale customers; in fact, several of them are higher in 2013 than 2012, which

is contrary to Mr. Rothstein's theory that there is a fundamental difference between ratios of peak usage to average usage during peak months versus other months.

Mr. Rothstein also speaks to the nature of peak residential demand and its variability. In reality, through the course of the study, it was found that the nature of peak residential demand is actually quite consistent, especially regarding how peak hourly demand fluctuates consistently with peak daily demands.

To sum up the residential analysis performed in the Customer Demand Study: MWW did monitor the residential class consistently, did monitor a peak period of usage, and the calculated peak demand ratios for the retail residential customer are based on actual data collected on an hourly basis.

Q. On page 6 of his direct testimony, Mr. Rothstein questions the inferences that can be drawn from the demand monitoring. Could you respond to this issue?

A. Yes. The Customer Demand Study clearly explained the inferences that could be drawn from the data and gave appropriate consideration to the time periods of data collection. Mr. Rothstein also claims that there is "inconsistency in the populations sampled across metering periods." This statement is unclear and requires further explanation.

Q. Mr. Rothstein makes several statements about the discussion within the Customer Demand Study on variability of peak demand ratios within given periods of sampling. Could you respond to these statements and further explain your findings?

A. Mr. Rothstein quotes a statement from the Customer Demand Study that talks about peak usage ratios within any given period during the year being constant throughout the year, and claims this assumption is contrary to intuition. However, the study tests this idea by looking at sample periods from three different periods during the year. In reviewing the

Study, it is clear that reality and analysis of actual data does not always reflect what seem to be intuitive concepts. The Customer Demand Study does not interpret the data in a way that asks the reader to believe that monthly peak demand ratios from different time periods "magically walk in lock step with the Maximum Period for the year." In fact, the study explicitly states the findings of each time period of analysis for each customer class, and derives its conclusions from these results. Mr. Rothstein claims that "a more intuitive conclusion" is that "peak to average demands are higher than other periods when the system is peaking." This may seem to be a logical assumption, but the data indicate that it is not true.

Table 24 from page 92 of the Customer Demand Study summarizes the peak to average demands for each customer class during each sample period. I will discuss this table in more detail. Focusing first on the residential sample, maximum day demand to average day demand ratios are similar in the fall 2012 (1.191) and spring 2013 (1.179), but higher during summer 2013 (1.403), when the system would have been peaking. In this case, it does appear that there is a connection between the overall peak demand and the monthly peak demand; in fact, this is exactly why the proposed residential peak day demand factor is based on this higher number. The maximum hour demand to average day demand ratios show a similar pattern (2.167, 2.201 and 2.615 for each period, respectively), and show a fairly consistent relationship to the peak day demand ratios; the ratios of the max hour ratio to the max day ratios equal 1.82, 1.87 and 1.86 for each period, respectively. Again, this is why the highest of the ratios was used in determining the proposed residential peak hour demand factor, as noted by Mr. Rothstein on page 9 of his direct testimony.

Moving on to the commercial sample, maximum day demand to average day demand ratios vary from 1.160 in fall 2012 to 1.448 in spring 2013 and 1.342 in summer 2013. Interestingly, the highest peak day demand ratio does not occur during the time when one might expect the overall peak usage; instead, it occurs during the wetter-than-average spring, as Mr. Planton noted in his direct testimony. For this reason, it is logical to infer that commercial demand is less affected by weather patterns and is more dependent on other factors. It is also why an average of the three periods was used to base the proposed commercial peak day demand factor, as noted on page 9 of Mr. Rothstein's direct testimony. Maximum hour demand to average day demand ratios exhibit somewhat similar results (2.540, 2.864 and 2.283 for each period, respectively), although in this case, the lowest peak hour demand ratio actually occurs during summer 2013, again contrary to the theory of higher peak demand ratios during months of higher overall demand.

For the industrial sample, maximum day demand to average day demand ratios exhibit similar patterns to the commercial sample: 1.151 during fall 2012, 1.534 during spring 2013 and 1.262 during summer 2013. Again, the average of these numbers was used in determining the proposed peak day demand factor for industrial customers because there is no clear correlation between the peak daily demand during the sample periods and the month of peak demand. Maximum hour demand to average day demand ratios vary in this way as well, with fall 2012 being the highest (1.947), spring 2013 being lower (1.807) and summer 2013 being the lowest (1.725). Regarding Mr. Rothstein's testimony that this is counter-intuitive, the opposite is actually more intuitive if one thinks about industrial demand variability. Industrial output (and correlating water

demand) is limited by production capacity. When demand is high, overall water demand is also high, but the maximum rate of production (and correlating hourly water usage) does not change. This means that the average water usage increases while the maximum hourly usage stays relatively constant, actually creating a lower ratio of peak water demand to average water demand. When demand is low, the inverse happens. Maximum hourly usage remains at the same level that is limited by production capacity, but the average water usage is lower, thus resulting in a higher ratio of peak water demand to average water demand. By using an average of these three sample periods in our calculation of industrial peaking factors, it is more likely that the ratios might be slightly overstated; however, this is a more fair and equitable method to determine a typical ratio.

For the public authority sample, again results are seen that counter Mr. Rothstein's theory. Maximum day demand to average day demand ratios range from 1.614 in fall 2012 to 1.511 in spring 2013, dropping to 1.212 in summer 2013. There is a much wider range of ratios occurring in maximum hour demand to average day demand ratios: 4.543 in fall 2012, 5.416 in spring 2013 and 1.746 in summer 2013. Again, using an average of these ratios to determine the proposed peaking factors for the public authority class is the most fair method, and in fact results in a higher peak hour demand factor than has been used in past rate cases.

The case for using the highest ratio that occurs during summer 2013 for the residential class and an average of the ratios for the other classes is amplified when breaking down the commercial sample into multi-family customers and other commercial customers. The multi-family sample shows demand patterns that are much more similar to the residential sample than the rest of the commercial sample or either of the other

customer classes. The highest ratio, both for peak day demand and peak hour demand, occurs in summer 2013, with the other two periods at a similar lower ratio. Also, the peak hour demand ratios again correlate fairly closely to the peak day demand ratios: the ratio of peak hour demand ratio to peak day demand ratio for each period is 1.53, 1.58 and 1.56, respectively. MWW does not yet have sufficient data on overall water demand for multi-family customers in order to include them as a customer class in this rate case proceeding, but will be continuing to monitor them separately in compliance with PSC guidelines.

Q. On page 9 of his direct testimony, Mr. Rothstein questions the derivation of seasonal peaking factors that are used to determine annual peaking factors for each retail customer class. Could you explain further how the seasonal adjustment factors were developed?

A. Yes. All available information was utilized. However, it might be helpful to explain the data that was available to determine the seasonal variation in demand by customer class. For non-residential customer classes, MWW provided billing records going back to the beginning of 2007. Within these records, some customers are billed on a monthly basis (generally the larger customers), and others are billed on a quarterly basis. This data was analyzed to determine average seasonal variation during this time, based on the ratio of the peak monthly usage to the average monthly usage (or said differently, the ratio of the average day during the peak month to the average day during the year). For the residential customer class, MWW provided 2007 through 2011 billing records at the beginning of the study. However, all residential customers are billed on a quarterly basis, limiting the precision of seasonal peaking analysis. Further complicating matters, bills are

sent out in a staggered cycle, so that about one-twelfth of all residential customers are billed during each week of the quarter.

The residential quarterly billing records were analyzed in an attempt to identify general quarterly peaking patterns. The results of that analysis showed that, on a quarterly basis, there was actually very little peaking, meaning that the average day during the peak quarter for each billing cycle was only slightly greater than the average day during the year for each billing cycle. This makes sense because, with the different billing cycles, the peak quarter of usage during the year may not match up with the billing cycle itself, but may be split between two billing cycles. For this reason, plus the fact that only quarterly information was available, plus the fact the majority of usage within the MWW system is from residential usage, it was decided that it would be appropriate to use the ratio of overall system average daily usage in the maximum month to system average daily usage for the year to approximate the seasonal peaking factor for the residential customer class. Regarding Mr. Rothstein's comment on using only two years of history, that is the data we had available regarding hourly system pumpage, so that is what was used to determine the system ratios. However, considering Mr. Planton's and Mr. Rothstein's comments on 2012 being a year of extreme peak usage, this would only serve to overstate the retail residential peaking factors slightly, without speaking to the validity of that argument.

Q. On page 9 of his direct testimony, Mr. Rothstein claims that using "information from different time periods…to derive factors that are then used to represent the inter-relationships between class demands over a <u>common</u> time period is fundamentally flawed." Is this statement accurate?

A. No. First, his statement implies that the demand factors were developed to represent peak demand during a common time period, which is incorrect. As I've stated throughout my testimony, the peaking factors were developed to represent a typical, or average, time period, while also reflecting current demand patterns (as opposed to demand factors based on data gathered in the 1970s and 1980s). This was done using the best available information. However, it is not uncommon to use data from different time periods, given the varying levels of available data. For example, the retail peaking factors that were used in MWW's 2009-11 Rate Case were developed using data from the late 1970s and 1980s as Christine Cramer stated in her direct testimony (PSC REF#:205694) in this proceeding, while the wholesale peaking factors were developed using data from 2007-2009, as Mr. Planton testified. Retail demand factors developed using data from the last several years are better than those using data from 25 – 35 years ago.

Q. On page 10 of his direct testimony, Mr. Rothstein comments on his claims of problems with the max-hour retail class demand factors. Could you respond to his comments and clarify the results of the analysis of maximum hour peak demand factors?

A. Mr. Rothstein claims that the Customer Demand Study fails to "obtain hourly customer demand metering over peak periods…instead the Study proposes to preserve the estimating assumption relationship between max-day and max-hour that hourly customer demand metering is intended to overcome." Neither of these statements is true. The Study did collect and analyze hourly demand data over several periods, one of which was summer 2013, when system peak usage normally occurs, and the Study does not propose to use assumptions as to relationships between maximum hourly demand and maximum

daily demand, although it does examine those relationships. The Study does apply the same seasonal peaking factors to both the measured maximum daily demand and the measured maximum hourly demand.

It is appropriate to use the same seasonal factors for both maximum day peaking factors and maximum hour peaking factors within the same customer class because what the seasonal peaking factors are actually accounting for is the variability in average usage throughout the year, rather than peak usage. In looking at the actual proposed demand factors in the Customer Demand Study, one sees that they are based on actual information collected and analyzed. Mr. Rothstein also fails to mention that retail customer demand factors were rounded up to recognize that there was less available information for retail customers than for wholesale customers.

Q. On pages 13 and 14 of his direct testimony, Mr. Rothstein criticizes the overall methodology of the Customer Demand Study Do you have any response to these comments?

A. Yes. In reviewing his testimony, Mr. Rothstein talks at great length on theories about peak demand relationships and characteristics and what he believes are intuitive assumptions and conclusions. Mr. Rothstein also notes on page 2 of his direct testimony that he has contributed to AWWA's *Principles of Water Rates, Fees and Charges*, specifically that for the 2012 edition, he "co-authored revisions to Appendix A: 'Development of Peaking Factors by Customer Class.'" In reviewing that section of the M1 manual, again there is only discussion of theoretical peaking factors and assumed relationships between maximum day and maximum hour demand. There is a lack of discussion on the effort that actually goes into conducting a demand study. MWW and

Trilogy took great care over a period of two years to develop and implement the study process, collect hourly metering data from hundreds of locations around the MWW service area, analyze over a million data points and use the results of the analysis to develop fair, reasonable and appropriate peak demand factors for all customer classes. In any study of this magnitude, there will inevitably be issues that arise that need to be overcome. However, MWW has gone above and beyond what the vast majority of utilities in the country have done to determine appropriate demand factors. Using the demand factors developed in this Customer Demand Study represents a great step forward in understanding the peak demand patterns of MWW's customers. Failing to use them would result in continuing to use factors that are based on assumptions that were made up before the technology to collect the data was available, and that we have shown do not reflect actual data.

Q. Is it your opinion that the demand ratios developed for all customer classes in the Customer Demand Study are the best factors to use in the cost-of-service for MWW?

A. Yes. The customer demand factors proposed by MWW were developed using an incredible amount of information and reflect actual data collected. The demand factors proposed by the wholesale customers are based on assumptions that ignore known data and relationships, contradict their own testimony and do not reflect current water demand characteristics.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.